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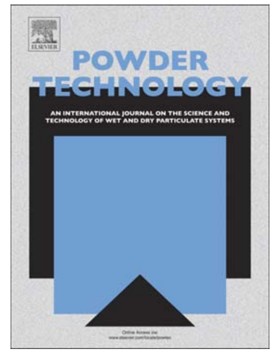


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# Gas-Solid Flow through the Mixing Duct and Tail Section of Ejectors: Experimental Studies

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**ABSTRACT**

Detailed experimental investigation has been conducted to study the single-phase (air-air) and the two-phase (air-solid) flows through ejectors. An attempt is made to increase the amount of transported solids by introducing design modifications to the mixing section of the ejector. The mixing duct has been augmented by a tail section. Three different geometries of the mixing duct with tail section of ejector have been designed, fabricated and tested experimentally. The effects of the mixing duct and tail section shapes on the ejector performance have been investigated. In addition, the effects of air motive pressure and the solid particles mass flow rate on the static pressure distribution and the vacuum pressure produced have been also studied. The obtained results show that the geometry of convergent-constant-divergent for the mixing duct gives higher vacuum pressure and favourable performance of the ejector.

***Keywords***: Ejector, air-solid ejector, mixing process, performance.

## 1- Introduction

Ejectors offer a simple, reliable, and low cost way to produce vacuum especially in pneumatic conveying systems where a supply of the high pressure motive gas is available. In the ejector, the driving gas having a high pressure flows through a motive nozzle to suck the gas or solid particles. The mixture of gas-solid particles passes through the mixing duct to the diffuser where the pressure is recovered. The literature contains enormous publications pertaining to ejector performance. Several investigations have examined the effect of ejector parameters on its performance. Sazbo [1] has studied the influence of the pressure of the primary gas jet on the final vacuum created by a supersonic gas ejector. Hung et al. [2] have analysed the ejector's performance on the basis of one dimensional flow. Nicolas and Mikhail [3] have described a thermodynamic ejector model based on experimental observations and CFD numerical results. A constant polytropic (or elemental) efficiency has been used to characterize the acceleration and deceleration processes rather than the constant overall isentropic efficiency. The two-phase flow of air-solid suspension through a vertical tube has been analytically investigated by Kovacs and Varadi [4]. Chellapan and Ramaiyan [5] have experimentally studied the design parameters of a gas- solid ejector. The effect of the suction